VERTICAL CAVITY SURFACE EMITTING LASER INCLUDING INDIUM IN THE ACTIVE REGION

ABSTRACT OF THE DISCLOSURE

Quantum wells and associated barriers layers can be grown to include nitrogen (N), aluminum (Al), antimony (Sb), phosphorous (P) and/or indium (In) placed within or about a typical GaAs substrate to achieve long wavelength VCSEL performance, e.g., within the 1260 to 1650 nm range. In accordance with features of the present invention, a vertical cavity surface emitting laser is described that includes at least one quantum well comprised of InGaAs; GaAsN barrier layers sandwiching said at least one quantum well; and GaAsN confinement layers sandwiching said barrier layers. GaAsN barrier layers sandwiching the quantum well and AlGaAs confinement layers sandwiching the barrier layers can also be provided with a InGaAs quantum well. AlGaAs barrier layers sandwiching the at least one quantum well and GaAsN confinement layers sandwiching the barrier layers can also be provided with a InGaAs quantum well. Quantum wells can be developed up to and including 50 Å in thickness. Quantum wells can also be developed with a depth of at least 40 meV.